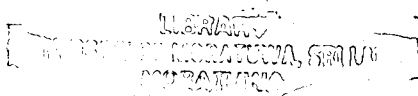


Thesis

TRANSMISSION NETWORK PLANNING USING GENETIC ALGORITHMS



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THIS THESIS WAS SUBMITTED TO THE DEPARTMENT OF COMPUTER
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Declaration

The work submitted in this thesis is the result of my own investigations, except where otherwise stated.

It has not already been accepted in substance for any degree, and also is not being concurrently submitted for any other degrees.

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Abstract

This project presents an application of Genetic Algorithm (GA) to solve Transmission Network Planning (TNP). The non-convexity that has been observed in the Transmission Network Planning cannot be solved effectively by conventional mathematical methods. GA has the ability to find the global optimal point in such a non-convex function.

It is recognized that the allocation of transmission costs in a competitive environment requires careful evaluation of alternative transmission network plans. As a result, the need for methods that are able to synthesize optimal transmission network plans has become more important than ever. Unfortunately, practice has shown that conventional optimization procedures are unable to produce optimal solutions for networks. The reason is that the transmission network planning problem is hard, large-scale combinatorial problem. The number of options to be analyzed increases exponentially with the size of the network.

The objective of TNP is to determine the installation plans of new facilities (lines & other network equipment) so that the resulting bulk power system may be able to meet the forecasted demand at the lowest cost, while satisfying prescribed technical, financial and reliability criteria. Although the conventional methods are somewhat successful in transmission network planning, some problems still exist:

- 1) Non-convexity (as described above): Therefore, the optimization process sometimes stops at non-optimal solutions.
- 2) Non-linearity: increases the iterations of the optimization algorithm and sometimes causes divergence.

As there are no fractional transmission lines, transmission network planning becomes a very complex mixed integer non-linear programming problem. GA can be used to select the optimal new transmission lines network with the least investment cost, while meeting the total load demands without any load curtailment.

The project done under the "Transmission Network Planning using Genetic Algorithm" has been successfully completed giving good results for the particular transmission network.

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TABLE OF CONTENTS

CHAPTER ONE

8

1.1 Introduction

CHAPTER TWO

2.1	Introduction to GAs	11
2.1.1	Biological Background	11
2.1.2	How are Genetic Algorithms different from traditional methods	12
2.2	A Simple Genetic Algorithm	13
2.3	Representation	14
2.4	Types of GAs	17
2.4.1	Generational GAs	17
2.4.2	Steady State GAs	17
2.5	Fitness Function	18
2.6	GAs Operators	19
2.6.1	Selection	19
2.6.1.1	Types of Selection methods	19
2.6.1.1.1	Roulette Wheel Selection	20
2.6.1.1.3	Ranking Selection	20
2.6.2	Crossover (Recombination.)	21
2.6.2.1	Types of Crossover methods.	21
2.6.2.2	Single-Point Crossover	21
2.6.2.3	Multi-Point Crossover	22
2.6.2.4	Uniform Crossover	22
2.6.2.5	Bit Simulated Crossover	23
2.6.2.6	Problem-Centred Crossover	23
2.6.2.7	Specialized Crossover	24
2.6.3	Mutation	24
2.6.3.1	Role of Mutation	25
2.6.4	Crossover and Mutation Probability	26
2.6.4.1	Crossover probability	26
2.6.4.2	Mutation probability	26
2.7	Search Space	26
2.8	Optimization Continuous and Discrete Problems	27
2.9	Applications of Genetic Algorithms	30

CHAPTER THREE

3.1	Modeling of GAs	31
3.1.1	Schemata and Other Terminology	31
3.1.2	Sets and Subsets	32
3.1.3	Processing	32
3.1.4	The Dynamics of a Schema	33
3.1.5	Compensating for Destructive Effects	34
3.1.6	Mathematical Models	35

CHAPTER FOUR

46

4.1	Introduction to Transmission Network Planning	46
4.1.1	Main Objectives of Transmission Network Planning	48
4.2	Load Flows	49

4.2.1	Bus Classification	50
4.2.2	Development of Load Flow Equations	

CHAPTER FIVE

5.1	Implementation	61
5.2	Flow Chart	63
5.3	Initialize the Population	63
5.3.1	Representation	63
5.3.2	Population Size	63
5.4	Load Flow Calculation	63
5.4.1	Fitness Evaluation	64
5.4.2	Minimize the cost	64
5.4.3	Reduce the number of over loaded lines	65
5.4.4	Increase the performance of the network	65
5.4.5	Line Fitness	65
5.4.6	Total Fitness of population	65
5.5	Selection	66
5.6	Crossover	67
5.7	Mutation	67

CHAPTER SIX

6.1	Results	69
6.2	Conclusion	94

APPENDIX A

APPENDIX B



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95
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LIST OF ILLUSTRATION

Figure 2.1	16
Figure 2.3	18
Figure 2.4	20
Figure 3.1	31
Figure 4.1	50
Figure 5.1	62
Figure 3.2	43

LIST OF TABLES

Table 3.1	40
Table 3.2	40
Table 3.3	41
Table 3.4	42
Table 3.5	43
Table 3.6	44
Table 3.7	44
Table 4.1	50



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